A.2.4 DISSOLVE AND VITRIFY

The SNF would be cropped and charged to an electrolytical dissolver similar to that used in H Canyon. The electrolyte solution would be nitric acid saturated with boric acid. The process would operate in a batch mode to ensure criticality control. Depleted uranium would be added, as needed, to reduce the uranium-235 enrichment to approximately 5 percent.

The dissolver solution would be transferred to a holding tank for chemical and radiological analyses to determine the need for any adjustments prior to the vitrification step. The solution then would be transferred to an electrically-heated melter, along with glass-forming chemicals. Several dissolver batches could be melted at once. The resulting molten glass, having been preanalyzed in the holding tank, should be of sufficient quality to be poured into canisters similar to those used at the Defense Waste Processing Facility. About 1,350 canisters would be produced for emplacement in about 270 repository waste packages.

Although DOE could perform dissolution using the existing equipment at H Canyon, the analysis in this EIS assumes the construction of a new Dissolve and Vitrify facility. Figure A-4 shows the Dissolve and Vitrify process flow diagram.

A.2.5 GLASS MATERIAL OXIDATION AND DISSOLUTION SYSTEM

The Glass Material Oxidation and Dissolution System (GMODS) converts SNF directly to borosilicate glass using a batch process. Criticality concerns are addressed by diluting the uranium-235 enrichment with depleted uranium and using boron oxide as a dissolving agent (boron is a neutron poison). Although the addition of depleted uranium and glass frit adds to the mass, the high-density, monolithic glass still would provide a smaller volume for dry storage than would Direct Co-Disposal.

The principal piece of equipment for GMODS would be an induction-heated cold-wall melter, which in commercial use converts corrosive or high-melting metals to ultrapure materials. The melter would be charged with a molten glass consisting of lead oxide and boron oxide. The lead oxide converts the metals in the SNF to oxides; oxides and amorphous materials tend to dissolve in molten glass, but metals do not. Boron oxide is a common agent for dissolving oxides into glass (e.g., welding slag). A problem

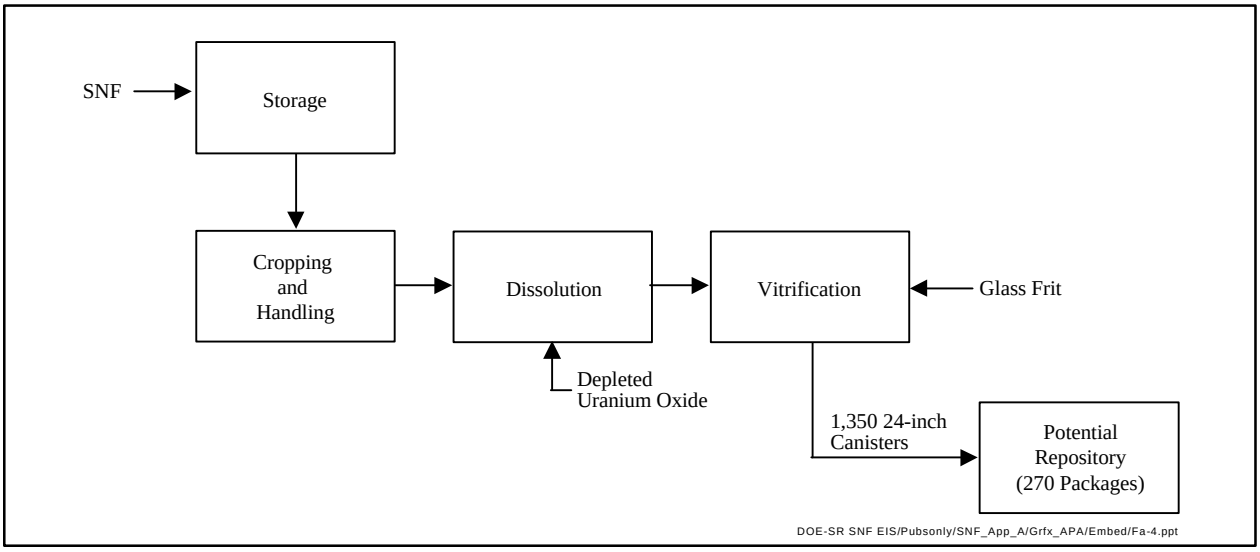

Figure A-4. Dissolve and Vitrify process flow diagram.